BEFORE THE
PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA

DOCKET NO. 2009-3-E

In the Matter of	)	
Annual Review of Base Rates	)	**TESTIMONY OF**
for Fuel Costs for	)	**JOHN J. ROEBEL**
Duke Energy Carolinas, LLC	)	
	)	

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION WITH DUKE ENERGY CAROLINAS.

A. My name is John J. Roebel and my business address is 139 E. Fourth Street, Cincinnati, Ohio, 45202. I am employed by Duke Energy Business Services, LLC as Senior Vice President, Engineering and Technical Services, and am an officer of Duke Energy Carolinas, LLC ("Duke Energy Carolinas" or "the Company").

Q. WHAT ARE YOUR DUTIES AND RESPONSIBILITIES AS SENIOR VICE PRESIDENT, ENGINEERING AND TECHNICAL SERVICES?

A. I supervise and am responsible for the professional group that provides the technical support to the electric generating plants of the subsidiaries of Duke Energy Corporation ("Duke Energy"), including the generating plants of Duke Energy Carolinas and other generating subsidiaries of Duke Energy. This technical support includes services such as engineering, new technology evaluation, project management, environmental equipment and combustion by-product management, maintenance support, and equipment support to enable Duke Energy Carolinas to construct and operate a safe, reliable, and efficient generation portfolio.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I received a bachelor's degree in Mechanical Engineering from the University of Cincinnati Engineering College in 1980. Since that time I have taken graduate courses, primarily in business administration, from both the University of Cincinnati and from Xavier University.

I worked for The Cincinnati Gas & Electric Company ("CG&E") as a co-op student in the engineering area during undergraduate school, and became a full-time employee after graduation in 1980. Since joining CG&E, and later Cinergy Services, Inc. after the merger of PSI Energy, Inc. ("PSI") and CG&E, I have held a number of positions of increasing responsibility in the engineering and construction management areas. Some of those positions include mechanical project engineer for a new coal-fired unit, project manager on the conversion of CG&E's Zimmer station from nuclear to coal, as well as leading the design and construction of CG&E's Woodsdale Generating Station. I was promoted to my present position in April, 2006.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to discuss the performance of Duke Energy Carolinas' fossil-fueled and hydroelectric generating facilities during the period of June 1, 2008, through May 31, 2009. I discuss the impact of planned outages and drought conditions experienced in the Carolinas on the fossil and hydroelectric generation fleet and the status of construction and operation of environmental controls equipment at coal-fired stations. In addition, I address certain variable environmental costs that are included in the proposed fuel factor.

Q. PLEASE DESCRIBE DUKE ENERGY CAROLINAS' FOSSIL AND HYDROELECTRIC GENERATION PORTFOLIO.

A. Duke Energy Carolinas' Fossil/Hydro generation portfolio consists of 14,032 megawatts ("MW") of generating capacity, made up as follows:

Coal-fired generation -	7,672 MWs
Hydroelectric -	3,218 MWs
Combustion Turbines -	3,142 MWs

(Combustion turbines can operate on natural gas or fuel oil)

This portfolio includes a diverse mix of units that, along with additional nuclear capacity, allow the Company to meet the continuously changing customer load pattern in a logical and cost-effective manner. The cost and operational characteristics of each unit generally determine the type of customer load situation that the unit would be called upon to support. Base load units typically have lower operating costs but higher initial capital costs to install than other generating units. These larger units are called upon first to support customer load requirements and, thus, run almost continuously. In addition to Duke Energy Carolinas' seven nuclear units, the seven largest coal-fired units often operate under these base load conditions. Intermediate units are dispatched next to support customer demand, ramping up and down throughout each day to match load requirements as they change. These units take time to ramp up from a cold shut down and are best used to respond to more predictable system load patterns. This intermediate fleet is made up of thirteen coal-fired units. During periods of highest customer demand, many of these intermediate units will also operate at maximum capacity and almost continuously along with the base load units discussed above.

Peaking units typically have higher operating costs but relatively lower initial capital costs to install than base load or intermediate units. They have the ability to be started quickly in response to a sharp increase in customer demand, without having to operate continuously. These peaking units are called upon when customer demand is high and thus typically have lower capacity factors than the base load or intermediate units. The remaining ten small coal units as well as the entire hydroelectric fleet and entire gas/oil-fired combustion turbine fleet make up this peaking category. The Company's hydroelectric and combustion turbine units are especially good for supporting abrupt changes in load demand as their generation output can usually ramp up or down very quickly.

Company Witness Ronald A. Jones will discuss the nuclear fleet in his testimony.

Q. PLEASE EXPLAIN THE BENEFITS OF THE COMPANY'S DIVERSE MIX OF GENERATING UNITS.

A. Operating a generating fleet with a great amount of diversity of fuel and operating characteristics, combined with purchased power and demand-side options, provides the Company with opportunity to meet all load demand scenarios in the most cost-effective manner. Based on the load demand that the Company is called upon to serve at any given point in time, operators select the combination of generating unit and purchased power options that will produce electricity in the most economical manner with consideration for issues such as reliability of service, environmental compliance and safety. This cost-optimization approach to system operations allows for the minimization of the total cost of providing electric service to customers.

Q. HOW DOES THE COMPANY DECIDE WHEN TO OPERATE EACH TYPE OF GENERATING UNIT?

A. Each day, Duke Energy Carolinas selects the combination of Company-owned generating units and available power purchases that will most reliably meet customer needs in a least-cost manner. Available units with the lowest operating costs (fuel, emission allowances, and variable operating and maintenance costs, etc.) are dispatched first, with higher cost units added as load increases. Intraday adjustments are made to reflect changing conditions and purchase opportunities.

Q. PLEASE DESCRIBE HOW PURCHASES OF POWER FROM OTHER SUPPLIERS FIT INTO THIS PROCESS.

A. The Company monitors the energy market, evaluating long-term, seasonal, monthly, weekly, daily, and hourly purchase opportunities. In making these daily decisions on which resources should be used to meet customer needs, the Company may purchase energy from other suppliers, whether under existing long-term capacity agreements or short-term spot market purchases, to ensure it selects the most cost-effective and reliable solution.

Q. WHAT CHANGES TO THE FOSSIL/HYDRO GENERATION PORTFOLIO CAPACITY HAVE BEEN MADE DURING THIS REVIEW PERIOD?

A. As a result of the installation of the flue gas desulfurization ("FGD" or "Scrubber") equipment at the Belews Creek Steam Station for sulfur dioxide ("SO_2") emissions reduction, the coal fleet capacity has decreased by 50 MW (25 MW each for Belews Creek Units 1 and 2). These 50 MWs must now serve the auxiliary load requirement for this pollution control equipment.

As a result of a review of the current operating capabilities of the older and smaller combustion turbines located at the Buck, Dan River, and Riverbend facilities, the peaking combustion turbine fleet capacity has decreased by 124 MW (31 MW across Buck Units 7C, 8C, and 9C; 37 MW across Dan River Units 4C, 5C, and 6C; and 56 MW across Riverbend Units 8C, 9C, 10C. and 11C).

Q. WHAT ARE THE COMPANY'S OBJECTIVES IN THE OPERATION OF ITS FOSSIL AND HYDROELECTRIC GENERATING UNITS?

A. The primary objective of Duke Energy Carolinas' Fossil/Hydro generation personnel is to safely provide reliable and cost effective electricity to the Company's Carolinas customers in compliance with all applicable environmental regulations. This objective is achieved through the Company's focus on a number of key areas. Operations personnel and other station employees are well-trained and execute their responsibilities to the highest standards, in accordance with procedures, guidelines and a standard operating model. Duke Energy Carolinas achieves compliance with all applicable environmental regulations and maintains station equipment and systems in a cost-effective manner to ensure reliability. The Company also takes action in a timely manner to implement work plans and projects that enhance the performance of systems, equipment and personnel, consistent with providing low-cost power options for the Company's customers. Equipment inspection and maintenance outages are executed with quality, well-planned, and scheduled when appropriate, with the primary purpose of preparing the plant for reliable operation until the next planned outage.

Q. WHAT HAS BEEN THE HEAT RATE OF DUKE ENERGY CAROLINAS' COAL UNITS DURING THE REVIEW PERIOD?

A. Heat rate is a measure of the amount of thermal energy needed to generate a given amount of electric energy and is expressed as British thermal units ("BTU") per kilowatt-hour ("kWh"). Over the review period, the average heat rate for the coal fleet was 9,626 BTU/kWh. A low heat rate indicates an efficient fleet that uses less heat energy from fuel to generate electrical energy. Duke Energy Carolinas has consistently been an industry leader in achieving low heat rates. In the January/February 2009 issue of *Electric Light and Power* magazine, Duke Energy Carolinas' Belews Creek Steam Station and Marshall Steam Station ranked as the country's third and sixth most energy efficient coal-fired generators, respectively. In this publication, the Belews Creek Steam Station heat rate was calculated at 9,079 BTU/kWh, and the Marshall Steam Station heat rate was calculated at 9,341 BTU/kWh. Over the review period, the Belews Creek and Marshall units provided the majority (70.2%) of coal-fired generation for Duke Energy Carolinas.

Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DUKE ENERGY CAROLINAS' FOSSIL GENERATING UNITS DURING THE REVIEW PERIOD.

A. Duke Energy Carolinas' coal-fired generating units operated efficiently and reliably during the review period. Two key measures are used to evaluate the operational performance of generating facilities: (1) equivalent availability factor, and (2) capacity factor. Equivalent availability factor refers to the percent of a given time period a facility was available to operate at full power if needed. Equivalent availability is not affected by the manner in which the unit is dispatched or by the system demands; however, it is impacted by planned and unplanned (*i.e.*, forced) outage time. Capacity factor measures the generation a facility actually produces against the amount of generation that theoretically could be produced in a given time period, based upon its maximum dependable capacity. Capacity factor is affected by the dispatch of the unit to serve customer needs. Given the different operating characteristics for each generating unit, it is appropriate to evaluate these factors based on the operational categories discussed previously – base load, intermediate, and peaking.

Duke Energy Carolinas' seven base load coal units achieved results of 85.1% equivalent availability factor and 73.5% capacity factor over the review period. During the peak summer season within this review period, these base load units achieved excellent results of 89.4% equivalent availability factor and 79.4% capacity factor. The Company's thirteen intermediate coal units achieved results of 86.8% equivalent availability factor and 39.6% capacity factor over the review period, and performed similarly during the summer peak months at 85.2% equivalent availability but with a higher capacity factor of 50.0%. Duke Energy Carolinas' ten peaking coal units achieved results of 89.7% equivalent availability factor and 15.1% capacity factor for the review period, and performed well during the summer peak months at 84.5% equivalent availability but with a higher capacity factor of 27.2%.

The capacity factor for the entire coal-fired generating fleet was 59.0% for the review period and 66.7% during the summer peak months. Overall, the coal units achieved a fleet-wide availability factor of 86.0% for the review period and 87.8% during the summer peak months. These results compare favorably with the most recently published NERC average equivalent availability results for all North American coal plants of 84.8%. This NERC availability average covers the period 2003-2007 and represents the performance of over 800 North American coal-fired units.

The Company's combustion turbines were available for use as needed in this time period, most notably in June 2008 when extreme temperatures created high load demand. A key measure of success for the combustion turbine fleet is starting reliability. During the twelve-month period, the large combustion turbines at the Lincoln, Mill Creek and Rockingham plants had 521 successful starts out of 539 requests for a 96.7% starting reliability result.

These results are indicative of solid performance and good operation and management of Duke Energy Carolinas' fossil fleet during the review period.

Q. PLEASE DISCUSS THE PERFORMANCE OF THE COMPANY'S HYDROELECTRIC FACILITIES DURING THE REVIEW PERIOD.

A. The hydroelectric fleet had outstanding operational performance during the review period with an overall availability factor of 92.8%. This availability factor measurement refers to the percentage of a given time period that each hydroelectric unit was available to operate if needed. This availability measure is not affected by the manner in which the unit is dispatched, but is impacted by the amount of unit outage time.

Q. PLEASE DISCUSS THE IMPACT OF THE DROUGHT CONDITIONS ON THE COMPANY'S HYDROELECTRIC AND FOSSIL GENERATING UNITS DURING THE REVIEW PERIOD.

A. While recent rains have improved reservoir, streamflow and groundwater conditions to normal levels, generation restrictions at Duke Energy Carolinas' Buck, Cliffside and Dan River coal-fired facilities due to cooling water thermal limitations did occur during the summer and early fall months of 2008 when drought conditions in the Company's service territory were most severe. The Company also de-rated the four Jocassee pumped storage hydroelectric units by 10 MW each during the majority of the review period as a result of lake levels that were below target. It should be noted, however, that these drought conditions experienced in 2007 and 2008 did not limit the Company's ability to generate electricity at any of the base load generating facilities. As of the end of the review period, no generation restrictions remain as a result of the drought conditions experienced in the Company's service territory.

Q. PLEASE DISCUSS SIGNIFICANT PLANNED OUTAGES OCCURRING AT DUKE ENERGY CAROLINAS FOSSIL AND HYDROELECTRIC FACILITIES DURING THE REVIEW PERIOD.

A. In general, planned maintenance outages for all fossil and larger hydroelectric units are scheduled for the spring and fall to maximize unit availability during periods of peak demand. Most of these units had at least one small planned outage during this review period to inspect and repair critical boiler and balance of plant equipment or for the final tie-in of new environmental control equipment. Five of the thirty coal units had extended planned outages of three weeks or more, with the primary driver for two of these five extended planned outages being to install new environmental control equipment with the unit off-line. As a result of these planned outages during the review period, all five units at Allen now are operating with the Scrubber technology in place for reduced SO_2 emissions, and Selective Catalytic Reduction ("SCR") equipment is now in service on Marshall Unit 3 to support additional nitrogen oxide ("NO_x") emission reductions in the Charlotte region. The remaining three significant planned outages on coal-fired units were required for boiler section replacement work (Buck Unit 6) or regularly scheduled turbine, boiler and FGD equipment inspection and maintenance (Belews Creek Unit 1 and Marshall Unit 4).

For the large combustion turbine fleet, two units at the Lincoln facility underwent regularly scheduled hot gas path inspection outages, and two units at the Mill Creek facility underwent regularly scheduled combustion inspection outages.

Q. PLEASE DISCUSS HOW THE COMPANY'S PROGRESS ON ENVIRONMENTAL CONTROLS AND COMPLIANCE PROJECTS IMPACTS THE AVAILABILITY OF THE FOSSIL FLEET.

A. As I discussed earlier, the Company continued to install pollution control equipment over the review period. This equipment is required to reduce NO_x and SO_2 emissions in accordance with federal, state and local requirements. SCR or Selective Non-Catalytic Reduction ("SNCR") equipment is now installed and operational on 18 coal-fired units. Burner replacements have also been installed on other peaking coal units for enhanced NO_x performance. Duke Energy Carolinas also made significant progress on the installations of Scrubber technology in support of SO_2 emission limits. Scrubbers at Marshall and Belews Creek were placed in service prior to the review period, and Scrubbers for all five Allen units were place in service during the review period. The remaining Scrubber installation at Cliffside Unit 5 is in progress.

Duke Energy Carolinas minimizes the amount of scheduled outage time necessary for these environmental equipment additions when possible by performing multiple projects during a scheduled outage and performing as much construction work as possible while the units are online. However, these mandated environmental installation projects require significantly greater planned outage days as compared to that typically experienced for the fossil fleet. In addition to the outages necessary for installation of these environmental controls, having this environmental equipment in service impacts the day-to-day operation of the fossil fleet. The SCR and Scrubber equipment require auxiliary power which reduces the overall output of these facilities. Retrofitting existing units to support such equipment is also expected to result in balance of plant operational issues that the station personnel must monitor and address as they arise.

Q. PLEASE DISCUSS THE USE OF REAGENTS IN CONNECTION WITH THE OPERATION OF ENVIRONMENTAL EQUIPMENT ADDITIONS.

A. As discussed above, Duke Energy Carolinas is required to install and operate pollution control equipment on its coal units in order to meet various federal, state and local reduction requirements for NO_x and SO_2 emissions. The SCR technology is currently installed and operational on four coal units, and the SNCR technology is currently installed and operational on 14 units for the purpose of reducing NO_x

emissions. The Scrubber technology has been installed and is now operational on 11 units for the purpose of reducing SO_2 emissions with an additional installation at Cliffside Unit 5 in progress. Each of these technologies requires the presence and consumption of a reagent in order for the chemical reaction to occur that eliminates the NO_x or SO_2 emissions. The SCR technology that the Company currently operates uses ammonia or, in the case of Marshall Unit 3, urea in the presence of a catalyst for NO_x removal, and the SNCR technology injects urea into the boiler for NO_x removal. The Scrubber technology that the Company operates uses crushed limestone for SO_2 removal. Organic acid (often referred to as "DBA" or "dibasic acid") can also be used with the Scrubber technology for additional SO_2 removal.

The quantity of reagent consumed in these emission reduction processes varies depending on the generation output of the unit, the chemical constituents in the coal being burned, and the level of emission reduction required. Station operators must monitor each of these parameters to ensure that the equipment is being operated in the most efficient and effective manner possible, optimizing emission reduction goals and the overall cost effectiveness of unit operations.

Q. HOW DOES THE COMPANY ENSURE THAT COSTS ASSOCIATED WITH CONSUMING THESE REAGENTS ARE PRUDENT AND MANAGED EFFECTIVELY?

A. The Company's objective in procurement of these environmental reagents is to provide the stations with the most effective total cost solution for operation of the unit, understanding the technical capabilities of the equipment, assessing reagent needs over the long-term, assessing the various reagent markets, and looking for leverage opportunities with the reagent purchase contracts between stations and with Duke Energy's Midwest operations.

Technical and sourcing teams have been established to accomplish these objectives for the NO_x reagents in use, currently ammonia and urea. These teams have addressed short-term issues associated with reagent sourcing, including the review and refinement of transportation methods and award of regional reagent supply contracts, and have developed strategies for the long-term. Company Witness Vincent A. Stroud addresses the procurement of limestone used for SO_2 removal.

Q. WHAT COSTS FOR AMMONIA, UREA AND ORGANIC ACID ARE INCLUDED IN THE COMPANY'S PROPOSED FUEL FACTOR?

A. For the period of June 1, 2008, through May 31, 2009, Duke Energy Carolinas incurred costs of $8.6 million for ammonia in operating the SCR equipment at the Belews Creek and Cliffside stations and $5.1 million for urea in operating the SNCR equipment at the Allen, Buck, Marshall, and Riverbend stations and SCR equipment on Marshall Unit 3. Organic Acid costs were incurred only in minute amounts in operating the Scrubbers at Marshall. Witness Stroud discusses limestone costs in his testimony.

With these recent environmental equipment additions placed in service, these reagent costs are expected to increase. For the period of June 1, 2009, through September 30, 2010, Duke Energy Carolinas is currently projecting to consume approximately $8.9 million worth of ammonia in operating the SCR equipment at the Belews Creek and Cliffside stations and approximately $8 million worth of urea in operating the SNCR equipment at the Allen, Buck, Marshall, and Riverbend Stations and the SCR equipment on Marshall Unit 3. Organic acid is not expected to be consumed in any significant quantities in operating the Scrubber equipment at the Marshall, Belews Creek and Allen stations over this same time period. In addition to the limestone consumption discussed by Witness Stroud, the Company has included $16.9 million in estimated ammonia and urea reagent cost in calculating the variable environmental component of its proposed fuel factor.

Q. DOES THAT CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.